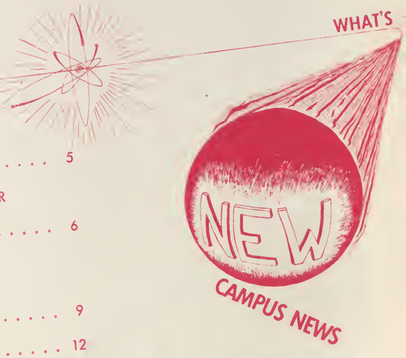
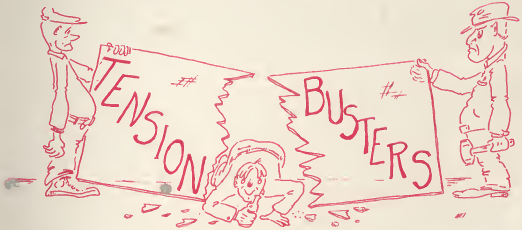
The Mechelециv

VOL. 20 OCTOBER 1961 NO. 1

EDITORIAL



MECH MISS



THE GEORGE WASHINGTON UNIVERSITY

OCTOBER 1961

This mark tells you a product is made of modern, dependable Steel.

How cold is up? We know that outer space can never be colder than minus 459.72° Fahrenheit—that's absolute zero, the point at which all molecular motion ceases. We don't know what coldness like this will do to materials, but we're finding out. Scientists are using a heat exchanger to produce temperatures as low as minus 443° Fahrenheit. They test materials in this extreme cold and see how they perform. Out of such testing have already come special grades of USS steels that retain much of their strength and toughness at −50° or below; steels like USS "T-1" Constructional Alloy Steel, TRI-TEN High Strength Steel, and our new 9% Nickel Steel for Cryogenics applications. And the heat exchanger to produce the −443° Fahrenheit is Stainless Steel! No other material could do the job as well. Look around. You'll see steel in a lot of places—getting ready for the future. ■ For information about the many career opportunities, including financial analysis or sales, write U. S. Steel Personnel Division, Room 6085, 525 William Penn Place, Pittsburgh 30, Pa. U. S. Steel Is an Equal Opportunity Employer. USS, "T-1" and TRI-TEN are registered trademarks.

USS United States Steel

what comes after the wheel?

ford motor company's educated guess

Frankly, there is no practical substitute for the wheel today. But at Ford Motor Company, our scientists and engineers refuse to give "no" for an answer. They are tackling, among others, the problem of wheelless vehicles for tomorrow.

Is "tomorrow" really far off? Not according to the men at Ford. Already they've developed the Levacar as one possibility. It replaces the wheel with *levapads*, perforated discs which emit powerful air jets to support the vehicle. Air suspension—if you will—of an advanced degree. Imagine traveling swiftly, safely at up to 500 mph, riding on a tissue-thin film of air. Guided unerringly by a system of rails. Propelled by powerful turboprops. This is the Levacar.

Meanwhile we've still got the wheel. And the job of building better cars for today. So we hope you won't mind riding on wheels just a little longer while we concentrate on *both* tasks.

Ford

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The American Road, Dearborn, Michigan.

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1961 Engineering School Queen-Rolande Boucher

See Page 5

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the Mecheleciv

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ARTICLES

DEPARTMENTS

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Editorial Page

Fellow students:

Almost before we realize it, another school year is on us. We are busy becoming acquainted with new things. There are new professors, new courses, a new University administration, and for the freshmen, a new way of life.

Some things, however, are not so new. When those of us tied up in various school activities look around us, we see the same old faces.

People will offer the excuse that their studies are too pressing to allow them to waste time in activities. But do the activities waste time? Of course not. When employers examine college records of prospective employees, they are more impressed when they find an individual who has shown himself to be a leader, as well as a good student.

Naturally, not everyone can be a leader. You will find, though, that there is something missing if you come here just to go to class. It is essential that every engineering student be a member of his professional society. As such, a student has the opportunity to get the full picture concerning his chosen profession. He is exposed to the latest developments in his particular field, and he is able to talk with a number of people who share his interests.

I am not trying to convince anyone that studies are of secondary importance. They are still the primary purpose for being here, but they are not the only one. The person who combines studies and professional society activities is better educated than the one who does not.

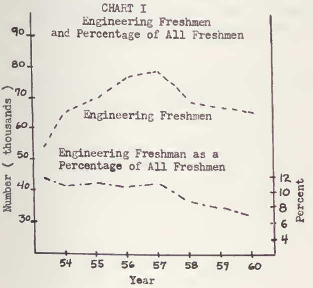
So I would urge every student to join at least the professional society corresponding to his field. Those who don't are only hurting themselves.

Floyd F. Mathews, Jr.
Engineer's Council President

ENGINEERING ENROLLMENTS • • • •

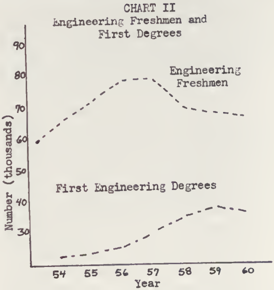
• • • • AND PROJECTED DEGREES

From 1950 to 1957, freshman engineering enrollment rose at a marked rate. In 1958, however (due to many factors including a recessionary trend and the popularity of careers in science), engineering freshman enrollments suddenly dropped 11%. Chart I illustrates this development and, more important, the steady decrease relative to total freshman enrollments. Although "total freshmen" includes both sexes and all schools, plots against men only and ECPD schools show no significant change in trend.

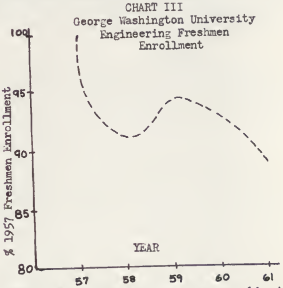


How do freshman enrollments in engineering affect degrees granted? Chart II shows the relationship based on retention rates. Since "retention" includes such factors as transfers, it is a comparison of starting and graduating numbers rather than the experience of a fixed group.

During the last few years, rates of retention have not fluctuated to a great extent (48.7% for engineers entering in 1956 and graduating in 1960). Assuming a continued retention in the neighborhood of 50%, Chart II shows the resulting drop in degrees for the next four years. By 1964 the graduating class should be in the neighborhood of 34,000. In order to achieve our present level of degrees (37,800) in 1965, freshman enrollments this fall (1961) must increase by over 8,000 (or 12%).



Here at George Washington University the enrollment statistics parallel the national pattern. The freshman class enrollment reached a peak in 1957 and then began a decline as shown in Chart III.



Masters' degrees as a percentage of bachelors' degrees one year earlier have dropped from 20.2% in 1956 to 18.3% in 1960, although the actual number increased from 4,589 to 6,989. Doctors' degrees compared with bachelors' degrees three years earlier remained at 2.5% during the same interval.

The 1961 Engineering School Queen is a beautiful 21 year old senior majoring in speech correction. "Rollie" began her reign last May, when she was crowned at the Engineers' Ball. Besides serving the Engineering School she has found time to work at The George Washington Speech Clinic and take part in, to mention just a few, the following activities: Student Activities Council, Secretary of Delta Gamma Sorority, Madison Hall House Council President, Rifle Club, and Sigma Alpha Eta Speech and Hearing Honorary. The engineers are not the only ones who realize how charming this young lady is; she was also elected "Miss Brandywine Motorsport Club 1960."

"Rollie" will be seeking a new title this week as the Homecoming Queen Candidate for the School of Engineering. Naturally we, as engineers, feel that she is best qualified and we all hope that she will win. However, hoping is not enough. SUPPORT OUR CANDIDATE WITH YOUR VOTES.

The Destructive Effects of Nuclear Weapons on Man

by Lee Kaminetzky

Since the explosion of the first atomic bomb on the sands of Alamogordo, New Mexico, in July, 1945, man has known of the tremendous power associated with nuclear weapons. Twice, in Hiroshima and Nagasaki, Japan, the energy was released against him; the damage to buildings and the loss of life was indeed very substantial. The destruction was from an atomic bomb. Now there is a hydrogen bomb with many times the power--for more death and devastation. In the future there looms the hideous shadow of a cobalt bomb, a neutron bomb, and an infinite series of other more dangerous and powerful nuclear weapons. The average person may feel slightly impersonal about the entire matter and say that "sure it could happen to them, but it can never happen to us." He would make that statement because he does not really know the effects of nuclear weapons--how the various forms manifest themselves and how the damage is done. But the bombs are also rather coldly impersonal--they will explode for anybody. If the effects of the weapons are known, however, man can begin to work out a solution to his problem of how not to end his life in a cloud of vapor. He needs only to know what he is facing--imminent disaster--then he can take steps to remedy the situation and remove the constant threat of a nuclear war.

The principles of operation of the atomic and hydrogen bombs are quite different. The atomic bomb explosion involves the fission, or splitting, of the nucleus of the radioactive elements uranium-235 (U-235) or plutonium. If uranium is used, two wedge shaped pieces, each less than the critical mass necessary for the explosion, are brought together very quickly by a chemical explosive like TNT. The uranium nucleus is then bombarded by low energy neutrons, uncharged particles from the nucleus of the TNT atoms. This action causes the nuclei of U-235 to vibrate, elongate, split, and fly off in all directions at a speed of ten thousand miles per hour. But the fragments travel only a few thousandths of an inch before they collide with other atoms and cause them to split. A chain reaction is initiated in which billions of atoms are involved, each liberating a huge amount of energy--a total energy equivalent to twenty thousand tons of TNT.

Although there is no chain reaction as such in the hydrogen bomb, more energy is released. The necessary element of the H-bomb is an exploding atom bomb. The heat developed causes the two isotopes of hydrogen, deuterium and tritium, to fuse together, forming a nucleus of the element helium. This process liberates energies equivalent to the force of fifty million tons of TNT quite "easily."

Characteristic of an exploding nuclear bomb is a flush of blue-white light, a rush of heat, a huge pressure wave, and a deafening, booming sound. A white mushroom cloud is created, which is followed by a purple-brown cloud caused by the suction of dust and smoke. In the process three forms of energy are released: blast, heat, and radiation. Each type caused instant death of all living things up to one kilometer from the hypocenter, in the case of the relatively small twenty thousand ton Hiroshima atomic bomb. Although the three forms taken separately would cause a substantial amount of damage, the sum total of the destruction capable of the combination produces a super-bomb of unimaginable power.

The blast effect of nuclear weapons is due to the rapid expansion of the compressed gases in the center of the bomb. The power developed in the blast from only one pound of uranium is equivalent to five million pounds of coal or three million pounds of gasoline. This substantial amount of energy formed in the blast is manifest in two phases of a pressure wave. The positive part of the wave inflicts the greater amount of damage. At Nagasaki, winds of 500-1000 miles per hour were caused by the expanding gas; the pressures were as high as 12,000 pounds per square foot. Frame buildings were easily mashed, burying their occupants in heaps of rubbish. Reinforced concrete structures remained standing, but the shock wave destroyed their interior, as windows, doors, and partitions were blown in all directions. The flying window glass imbedded itself in many person's skin and thus became one of the greatest causes of death in the Japanese cities. Occupants of structural steel buildings were not only hit by glass projectiles, but the masonry or glass shells of the buildings were pushed in, causing more dangerous debris to be scattered.

The positive pressure wave did not only do severe damage to occupants of buildings, but those persons in the streets were also effected. Although flying debris was also a hazard, as was the high wind, most damage was done inside their bodies. The air displaced by the explosion developed into a shock wave which compressed the body and internal organs, puncturing the lungs. A partial vacuum was formed throughout the body. As a result, the existing gas in the stomach and intestines expanded very quickly and exploded, rupturing internal organs and tissues. Since an air wave of 175 pounds per square inch can cause the heart to hemorrhage, exposed victims died from internal bleeding and profuse external bleeding from the nose and mouth.

The negative phase of the blast is caused by a partial vacuum near the hypocenter; the winds

blow toward the bomb site. Survivors of the positive wave may fall victim to the flying glass and debris moving in the opposite direction. Although the negative phase is weak from the pressure viewpoint, a reflected wave may combine with the negative phase to form a wave which is stronger than either. The wind would blow in all directions and induce debris to fly with it.

History has pointed out very vividly the blast effects on the city of Hiroshima. 62,000 out of 90,000 buildings were demolished, with 6000 more beyond repair. Not counting military, 78,150 died; 13,983 were missing; 9428 were severely injured; 27,997 were slightly injured; and 176,987 suffered; a total of 306,545 people were dead, wounded, or missing. These figures coldly illustrate the damage and the physical suffering; but there is no mention of the equally painful mental suffering which was omnipresent. Yet all was from a bomb which is now obsolete!

Predictions have been made as to the effect of a hydrogen bomb dropped on American cities. Here is one estimate of destruction:

> For example, in Washington, if ground zero were the Capitol, the total-destruction area would extend to the edge of Georgetown in the west, across the Anacostia River in the east, to Soldier's Home in the north, and covering practically all of Arlington Cemetery in the south.
>
> In Washington and its suburbs there live about 1,700,000 people (today, about 2,000,000). A recent computation by Dr. John Balloch of Johns Hopkins has figured that a ten megaton hydrogen bomb—a moderate size--dropped on the Ellipse behind the White House would, if it landed without warning (sic) kill about a million of these people and wound two thirds of the survivors.

The second effect of a nuclear blast is heat. At the center of the exploding atomic bomb, temperatures upward of one hundred million degrees Farenheit (100,000,000° F.) are created. The accompanying fireball completely consumes any matter near it--metals are melted; sand and soil form substances resembling fuzed quartz. Simultaneously, ultraviolet, infrared, and visible light are given off in the form of radiant energy. These rays have both primary and secondary thermal consequences.

The initial damage done at the Japanese blast sites was burns caused by the heat of the fireball and the fires lit directly by it. The ultraviolet light given off was enough to raise the temperature of a person's skin 50° C. (122° F.) in one thousandth of a second at a distance of four thousand yards. Those who were close to ground zero had their skin charred dark brown or black—they soon died. Those at a distance from the blast experienced burns as red marks on the skin which became infected very quickly. Since any amount of protection reduced the burn area, many people had curious designs on their bodies. Further, because dark objects absorb and light objects reflect heat, the fancy black and white patterns on women's kimonos were burned on the skin--black where there was dark cloth and no design where there was light-colored cloth.

The infection of these flash burns was followed by the formation of raised, flat patches of dense scar tissue. Keloids, which range in color from pink to brown, were caused by the infections and by the malnutrition of cells. Curiously, if a piece of skin from an unburned part of the body was grafted over the keloid scar, a new keloid formed over the new tissue. Doctors generally believed the patches to be a forewarning of the coming of cancer.

Eyes were also damaged by the primary thermal effects at Hiroshima. Some of the unfortunate ones near the hypocenter looked directly at the exploding bomb. Their faces were completely burned black; their eyes were melted by the heat, and the fluid ran down their cheeks. The majority of the people, however, were not permanently blinded, but they did suffer temporary loss of sight. There are two reasons for this: First, the light "consumed" all of the visual purple of the retina, causing blindness for about one half an hour, until more visual purple was produced. Second, infrared rays focused on the retina by the lens induced temporary blindness similar to the type experienced when one looks at the sun. This type of loss of sight lasted as long as a week.

The main thermal damage to the Japanese cities was an outcome of secondary effects. Inflammable objects fell on stoves, furnaces, electric power lines, and industrial process fires, causing many conflagrations. These fires spread quickly throughout the city, trapping victims in houses, buildings, and even streets. Those buildings which had their insides destroyed were especially prone to spreading fires. Convection currents set up by the burning city of Hiroshima formed small tornadoes which brought down trees, threw more debris in the air, and spread the existing fires even more—an area of 4.4 square miles was destroyed by the flames. Attempts to quench the fires were not made because of the destruction of most of the existing fire equipment and personnel and the breaking of water mains, which reduced the city's water pressure to nil.

Although the secondary effects caused many deaths from burns inflicted by falling timbers and

--Continued on next page

flaming buildings, the intense heat itself was also a harmful factor. Many people jumped into Hiroshima's Ota River to soothe their burns and quench their thirst. But the current proved too much for most, and as a result dead bodies were to be found near every puddle of water. The number of deaths attributable to the thermal effect of the bomb amounted to about twenty-five percent of the total dead in Hiroshima.

Radiation is a form of destruction that is peculiar to nuclear weapons. There are four basic particles which are the agents of radioactive materials and which do all the damage. Alpha particles, charged helium nuclei, are not very harmful, since one piece of paper is enough to block their passage. Beta particles, or high energy electrons, can do more damage--but 100 sheets of paper are good protection. However, gamma rays, which are very similar to X-rays, will not even be stopped by a lead shield one inch thick; and neutrons, uncharged nuclear particles, can be stopped effectively in fifty inches of concrete. Quite evidentally, gamma rays and neutrons can pass through the human body without being stopped, and, hence, they can disrupt cells very easily. All radiation is just the emission of these alpha, beta, gamma, and neutron rays.

When gamma rays and neutrons enter the living cell, they ionize the water, enzymes, and proteins. The primary action is the dissociation of the protein molecules of the cell into toxic substances called H-substances. This matter acts as a catalyst and causes water to react with itself. The water first decomposes into its elements, hydrogen and oxygen, and then recombines to form hydrogen peroxide. The formation of the peroxide induces changes in the enzymes, genes, and chromosomes, which become manifest as radiation sickness. The capture of neutrons causes the transmutation of the elements of the genes, resulting in a deleterious change in the cellular make-up. By either chemical or nuclear changes, the enzymes of the cell are disturbed, and they cause the radiation to spread--each enzyme effecting ten thousand or more molecules. Also, cells killed outright by radiation interfere with the blood supply to healthy cells and thus kill them. Therefore, small damage to a certain portion of the body has a magnified effect and causes radiation to spread quickly to an entire organ or to the entire body.

The whole blood producing system is effected by radiation. White blood cells called thrombocytes are very sensitive to ionizations--after irradiation, the white cell count dips to 1000 or less, where 5000-9000 is average. The resistance of the body is lowered substantially, so that even a small wound may be lethal. The body suffers a loss in the ability to produce antibodies and allows microorganisms which are normally saprophytic to prey on the body. If this phase of the disease is survived, in about a week, white blood cell production increases rapidly. The formation of the cells in the bone marrow may become uncontrollable; leukemia may develop. If the victim contracts this illness, chances are very small that he will survive. The leukemia rate of those Japanese exposed to the atomic bomb is 1000% that of elsewhere in the world.

The red blood cells composed of platelets, neutrophils, and erythocytes are also reduced on irradiation. The platelets are the main cells influencing internal hemorrhaging and the clotting of the blood. The cells are very small spherical bodies with a density of about 300,000 per cubic centimeter. On irradiation these cells decrease or disappear, causing internal hemorrhaging in the tissues and the failure of the blood to clot; this is the reason there was such profuse bleeding from cuts and from the mouth and nose after the Hiroshima and Nagasaki blasts. The reduction in the number of neutrophils and erythocytes cause the accumulation of wastes and harmful materials in the blood and the reduction in the ability to carry oxygen.

Bone marrow, the site of all blood production, is also very susceptible to damage by radiations. The interior blood producing cells coagulate, and the marrow cavity becomes filled with a gelatinous mass made up of degenerating cells. Blood, having coagulated in the marrow, then seeps through tissues into body cavities and out onto the skin, even though there is no body opening. Little blood spots called petechiae, which are characteristic of radiations, form under the skin.

The outcome of the irradiation of skin was summarized by Pierre Curie when he exposed his skin for ten hours. Of course, any radiation burns from a nuclear weapon would be more severe, but they would be of the same nature.

> After the action of the rays, the skin became red over a surface of six square centimeters, the appearance was that of a burn, but the skin was not painful, or barely so. At the end of several days, the redness, without growing larger, began to increase in intensity; on the twentieth day, it formed scabs, and then a wound which was dressed with bandages; on the forty-second day the epidermis began to form again on the edge, working toward the center; and fifty-two days after the action of the rays, there is still a surface of one square centimeter in the condition of a wound, which assumes a grayish appearance indicating deeper mortification.

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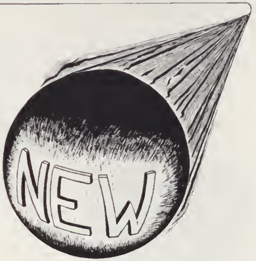
WHAT'S NEW

Edited by Doug Jones



SUPERCONDUCTING 'SUPER' MAGNET

Scientists at the Westinghouse research laboratories have achieved one of the most sought-for goals of modern science: development of the first super-strength superconducting magnet. For its size, weight, and energy consumption it is by far the most powerful magnet ever built.

Such a magnet has been vigorously sought in dozens of laboratories throughout the world. Until a year or two ago it was considered theoretically impossible to construct.

The size of a doughnut and only a pound in weight, the Westinghouse super magnet creates a magnetic field twice as strong as that from a conventional iron-core electromagnet as large as an automobile, weighing 40,000 pounds, and operated to saturation of the iron.

Such a conventional iron-core magnet needs its own power plant to continuously supply the 100,000 watts or more of power to run it.

In contrast, the new super magnet runs from an ordinary automobile storage battery. The only power the battery continuously supplies is a few watts to overcome the small losses in the wires leading to the magnet.

The superconducting magnet produces a magnetic strength, or flux density, of 43,000 gauss (43,000 lines per square centimeter). It has no iron core. Iron-core magnets begin to saturate at about 20,000 gauss, and can be driven to greater strengths only by the brute-force application of large amounts of power that force them beyond saturation. Their coils would melt almost instantly if they were not oil or water cooled.

The new magnet is the first of what are certain to be super-strength magnets of the future. Scientists agree that such magnets will revolutionize almost every aspect of man's use of electricity including the generation, distribution and use of electric power.

"A superconducting magnet will allow us to perform some of the most crucial scientific experiments of our time," Dr. J. K. Hulm, associate director of the Westinghouse research laboratories, declared.

"It enhances considerably our chances for the direct, large-scale generation of electric power. It makes possible a whole new generation of powerful atom smashers. It increases the possibility of a magnetic 'bottle' in which the vast energy of the hydrogen bomb reaction can be harnessed for useful power. It makes more feasible some of the far-out methods proposed for long-distance travel in space."

The new magnet is wound from a wire which is a superconductor. These are materials which have the remarkable property of losing all electrical resistance at temperatures near absolute zero (459 degrees below zero Fahrenheit). Once started, supercurrents of electricity flow through superconductors forever without loss in strength.

Until a few years ago superconductors were simply a laboratory curiosity. Scientists believed that strong magnets could not be made from them because the magnetism they create by their supercurrents destroys their superconductivity.

"Last year J. E. Kunzler and his associates at the Bell Telephone Laboratories demonstrated that certain superconductors retain their properties even in strong magnetic fields," Dr. Hulm said.

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MECHELECIV

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• One in a series of messages on how to plan your career

The Bethlehem loop course

What it is and how it works

The Loop Course is our program conducted annually for selecting and training qualified college graduates for careers with Bethlehem Steel. It was established 40 years ago. From the very beginning, it included an observational circuit (or "loop") of a steel plant, ergo the name. Many men holding key positions with Bethlehem today entered the company through the Loop Course.

Promotion from Within—The Loop Course is specifically designed to provide management personnel. Since it is our policy to promote from within, it is vital that competent men, well-grounded in our practices and policies, be available to fill management openings as they occur. And, due to Bethlehem's steady growth, there has been no lack of opportunities to advance.

The Basic Course—Every looper attends the initial five-week course held at our home office in Bethlehem, Pa., beginning early in July. He attends orientation lectures, listens to discussions by management men on all phases of company operations, and makes daily trips through the local steel plant. At the end of this period he has a sound basic knowledge of the Bethlehem organization.

Their First Assignments—At the end of the basic course, loopers receive their first assignments. Ordinarily a large majority report to our steelmaking plants, where they attend orientation programs much like the initial one at Bethlehem, but more specialized. During this period plant management closely observes each looper's aptitudes and interests, with the objective of assigning him to the department or job for which he appears to be best fitted, and corresponding as closely as possible to his educational background and work preferences.

Specialized Training—Loopers selected for sales, mining, shipbuilding, research, and the company's administrative departments, proceed from the basic course to specialized training programs varying according to the type of work.

Preparing for Advancement—As the looper gains in ability, experience, and knowledge, and as openings occur, he is moved into positions of increasingly greater responsibility. The company expects and encourages the looper to produce, to make steady progress. Regular reports as to his work and progress are made to department heads—and annual reports to divisional vice-presidents—throughout his career.

Emphasis on Technical Degrees—Because of the nature of Bethlehem's activities, the greatest demand is for men with technical degrees, especially those in mechanical, metallurgical, industrial, electrical, chemical, civil, and mining engineering.

Read Our Booklet—The eligibility requirements for the Loop Course, as well as a description of the way it operates, are more fully covered in our booklet, "Careers with Bethlehem Steel and the Loop Course." It will answer many questions undergraduates may have. Copies are available in most college placement offices, or may be obtained by writing to Manager of Personnel, Bethlehem Steel Company, Bethlehem, Pa.

All qualified applicants will receive consideration for employment without regard to race, creed, color, or national origin.

Steel

BETHLEHEM STEEL

BETHLEHEM STEEL

MECH MISS

Patricia Poindexter

Gentlemen, meet Miss Poindexter, a girl who likes engineers and said we could call her Pat. Pat is a junior majoring in psychology and has a deep interest in drama, dance, and horseback riding. Her interests are reflected in her talents. She dances, sings, and might even consent to sketch a few engineers.

Her winning ways have gained her a scholarship award, an outstanding achievement award, an outstanding initiate award, and many more. Her winsome ways have made her the Dogwood Queen of Virginia, Miss Virginia in the Miss Universe Contest, and many more including one that makes her a true engineer's girl – Miss Mountain Brewery.

This Salem, Virginia charmer would like to do graduate work in psychology. Yes, gentlemen, she is truly an integro-differential equation. Difficult to differentiate between the beauty and the brains and well integrated over the entire area.

'MISS UNIVERSE' COMBINES BEAUTY WITH HER ENGINEERING BRAINS

Here's something new in the world of charts, graphs, equations and vectors . . . an engineer who holds the title of Miss Universe.

Marlene Schmidt, a willowy blonde German, won over a bevy of beauties from all over the world to take top honors in the recent Miss Universe beauty contest. She earned her degree in engineering at the University of Jena in Jena, East Germany.

The 24-year old native of East Germany, who later emigrated to the West German Federal Republic, told the EE Digest in an exclusive interview that her special interests in the field of electronics and polarized light were given excellent grounding at Jena, one of the country's leading Universities. She studied all the main engineering disciplines, such as electronic techniques, weights and measures, optics, drafting, machine parts, and math.

ONLY WOMAN

Her formal educational background serves her in good stead in her work with I. G. Eckhardt, AG, Stuttgart, West Germany. Marlene is the only woman engineer among thirty men in her department. She designs and tests regulatory equipmen for the company, which manufactures such basic electronic indicating instruments as voltmeters, ammeters, and tachometers.

Marlene is also interested in continuing her work in polarized light, which was interrupted when she left East Germany for the Western zone. She was employed at a Research Institute there.

MARLENE SCHMIDT, "MISS UNIVERSE"

The beauty contest winner plans to take a year off and spend it in the United States, in personal appearance, movies and TV work, but her main interest is her engineering career. She will return next year to her work with the Stuttgart company.

CAN YOU IDENTIFY THIS BUILDING?

The first person who correctly identifies this building will receive one free ticket to this years Engineer's Ball. The Engineers Ball will be held on February 24, 1962 in conjunction with Engineer's Week. Entries should be in the Mecheleciv mailbox in the Davis-Hodgkins House by November 15th. Please include your name and address with your entry.

Help Wanted!

Positions are available on the editorial and production staff of THE MECHELECIV. Experience of this type is invaluable for personal satisfaction, job references, and development of creative skills. Applicants need not be engineering students. Interested persons may call the Mecheleciv office at FEderal 8-0250 Ext. 528 or leave their name at the Mecheleciv mailbox in the Davis-Hodgkins House.

ATTENTION ALUMNI

It is easy to understand why students who have spent most of their college time in large classes where they have been only a name on the roll and a point on a grade curve do not take an interest in university activities. However, this atmosphere is not found in the School of Engineering where the small classes and even smaller lab groups give everyone the opportunity to become acquainted with his fellow students. This attitude of "getting to know your neighbor" does not stop with learning about the people now in school. The students at George Washington are truly interested in finding out what other students are doing after graduation. With the aid of the Alumni Association, the Mecheleciv Magazine will begin with next month's issue to publish an alumni page. This idea could become a regular feature of the magazine, with the cooperation of you, the alumni. We would like to hear from you. Let us know where you work; let us know about any engagements, marriages, or children or about any other item you consider newsworthy. Your fellow students are anxious to read about you. Also we hope you will be looking for next month's issue so you can read about them.

Quality is the key to success at Western Electric

Admittedly, our standards are high at Western Electric. But engineering graduates who can meet them, and who decide to join us, will begin their careers at one of the best times in the history of the company. For plentiful opportunities await them in both engineering and management.

As we enter a new era of communications, Western Electric engineers are carrying forward assignments that affect the whole art of telephony from electronic devices to high-speed sound transmission. And, in the management category alone, several thousand supervisory jobs will be available to W.E. people within the next 10 years. Many of these new managers will come from the class of '62.

Now's the time for you to start thinking seriously about the general work area that interests you at Western Electric, the manufacturing and supply unit of the Bell Telephone System. Then when our representative comes to your campus, you'll be prepared to discuss career directions that will help make the interview profitable.

After a man joins Western Electric, he will find many programs that will aid him in exploring the exciting course of his career — while advancing just as fast as his abilities allow. And he'll be secure in the knowledge that he is growing with a company dedicated to helping America set the pace in improving communications for a rapidly growing world.

Challenging opportunities exist now at Western Electric for electrical, mechanical, industrial, and chemical engineers, as well as physical science, liberal arts, and business majors. All qualified applicants will receive careful consideration for employment without regard to race, creed, color or national origin. For more information about Western Electric, write College Relations, Western Electric Company, Room 6105, 222 Broadway, New York 38, New York. And be sure to arrange for a Western Electric interview when our college representatives visit your campus.

Western Electric

MANUFACTURING AND SUPPLY BELL SYSTEM UNIT OF THE BELL SYSTEM

Principal manufacturing locations at Chicago, Ill.; Kearny, N. J.; Baltimore, Md.; Indianapolis, Ind.; Allentown and Laureldale, Pa.; Winston-Salem, N. C.; Buffalo, N. Y.; North Andover, Mass.; Omaha, Neb.; Kansas City, Mo.; Columbus, Ohio; Oklahoma City, Okla. Engineering Research Center, Princeton, N. J. Teletype Corporation, Skokie, Ill., and Little Rock, Ark. Also Western Electric distribution centers in 33 cities and installation headquarters in 16 cities. General headquarters: 195 Broadway, New York 7, N. Y.

Japanese men and women experienced epilation, a temporary loss of hair. The nuclei of the cells of the scalp dissolved into water pockets, and the skin blood vessels remained dilated; hence, the hair fell out. When the vessels contracted, when something could hold the hair in, then the hair grew back, sometimes a grayish color. Although there was epilation of the scalp predominantly, hair also fell out from the face, body, and pubic regions.

On irradiation of the gastro-intestinal tract, the cells that line the mucous membranes become inflammed and turn a green-yellow-gray color. They swell and decrease in permeability, thus giving rise to diarrhea and ulcers. When the mucous lining becomes so swelled and water-logged that it can hold no more, it bursts, causing internal hemorrhaging. More ulcers and bloody diarrhea follow, reducing the resistance of the victim even further and paving the way for bacterial infection which may lead to death.

When radioactive particles are inhaled in great quantities, they become concentrated in the lungs. Lesions develop, air pockets become filled with fluid, and bronchioles become saturated with cell debris. Lung muscles undergo extensive hemorrhaging, which is frequently lethal.

Inhaled rays also bombard the mouth. The exposure causes lesions to develop in the teeth and gums. Teeth become dark and brittle and break off at the neck, due to the degeneration of cells at the roots. In the case of small children, a large dosage of radiation could stop growth and even cause a delayed eruption of a tooth.

The sexual cells are extremely radiosensitive--they absorb radiation very easily. Temporary sterility is frequently observed in exposed males and females because of the cells' hypersensitivity; lesions and small hemorrhages are very likely to occur simultaneously here, too. However the anxiety involved with irradiation of the sexual cells is not due to the effect on the survivor, but on his offspring. The National Academy of Sciences reported this:

> Practically all radiation-induced mutations which have effects large enough to be detected are harmful.
>
> A small part of the harm would appear in the first generation of the person who received the radiation. Most of the harm, however, would remain unnoticed, for a shorter or longer time, in the genetic constitution of successive generations of offspring. But harm would persist, and some of it would be expressed in each generation. On the average, a detrimental mutation, no matter how small its harmful effect, will in the long run tip the scales against some descendant who carries this mutation, causing his premature death or his failure to produce the normal number of offspring. . .

Extensive studies have been conducted to determine the true relationship between radiation and genetics. The results were that "no conspicuous genetic effects of the atomic bombs (on Japan) could be demonstrated." This would seem to divorce any connection between the two, but, in truth, no effects have been found to date; this does not mean that there is no effect. Even though many people will try to defend their apathy toward nuclear weapons by citing the above, there is still a need to fear the potency of the weapon for the damage it might do in five, ten, or fifty years from now.

The macroscopic effect of the atomic bombings in Japan was radiation sickness. The first indication was nausea, vomiting, and diarrhea, which lasted for two or three days after exposure. These symptoms cleared up rather quickly, but they returned in a few days. About a week after the blast, there was a loss of appetite, reddening of the mucous membrane of the mouth, and a fever as high as 104-6 degrees. Ulcers, petechiae, and hemorrhages became prevalent throughout the entire body. The drop in the number of red and white corpuscles caused anemia and the loss of resistance to bacteria, respectively, to develop. At this time, either the body began its slow crawl up the road to recovery, or death occurred from the inflicted radiation damage or from an infection due to a lack of resistance.

The life span of the survivors of Hiroshima and Nagasaki has been reduced by two months for every ten roentgens (10 r.) of radioactivity received over the whole body or a huge part of it. This amount may be compared to the 600 r. lethal dose for man and the 0.3 r. per week maximum safe dose. It has also been found that if man receives the maximum "safe" permissible amount of radiation in his life from fallout of test bombs, cosmic rays, and the like, his life will be shortened by about four years.

Even if man survives a nuclear war, he will still be at a loss; his food supply would be destroyed. A substantial dosage of radiation will cause plants to grow in an abnormal, non-beneficial way. They are affected by radiations in a manner similar to man, except mutations occur more quickly in plants—one generation is usually enough for mutational changes to become manifest.

One of the main products of a nuclear blast is strontium 90. Since it has an affinity for calcium,

--Continued on page 19

Some straight talk

about a career

at American Oil

by Roger Fisher

"This Company recognizes the value of varied experience, and encourages you to broaden your knowledge."

Roger Fisher, B.Ch.E. from Cornell and Ph.D. candidate from Princeton is one of many young scientists and engineers at American Oil shaping the future for himself, his Company and the industry. At 26, he has earned a Fulbright Scholarship and will take a year's leave of absence to continue his graduate research on solids mixing at the University of Osaka, Japan.

"American Oil is looking for broad-gauge research people," Roger adds. "In the long run, the Company benefits as well as the professional who continues to grow in his own or in several fields of research."

Roger's present assignment at American Oil involves applied research—to plan, design, build and operate bench scale lab equipment, to study the kinetics of catalytic cracking. His is one of many diversified projects at American Oil Company. Chemists, chemical engineers, physicists, mathematicians and metallurgists can find interesting and important work in their own fields.

The ability of American Oil to attract bright young scientists and engineers like Roger Fisher might have special meaning to you. For complete information concerning career opportunities in the Research and Development Department of American Oil, write D. G. Schroeter, American Oil Company, P. O. Box 431, Whiting, Indiana.

IN ADDITION TO FAR-REACHING PROGRAMS INVOLVING FUELS, LUBRICANTS AND PETROCHEMICALS, AMERICAN OIL AND ITS ASSOCIATE COMPANY, AMOCO CHEMICALS, ARE ENGAGED IN SUCH DIVERSIFIED RESEARCH AND DEVELOPMENT PROJECTS AS:

New and unusual polymers and plastics • Organic ions under electron impact • Radiation-induced reactions • Physiochemical nature of catalysts • Fuel cells • Novel separations by gas chromatography • Application of computers to complex technical problems • Synthesis and potential applications for aromatic acids • Combustion phenomena • Solid propellants for use with missiles • Design and economics: New uses for present products, new products, new processes • Corrosion mechanisms • Development of new types of surface coatings

AMERICAN

AMERICAN OIL COMPANY

TECH NEWS

Edited by Joe Sandford

NOVA

The National Aeronautics and Space Administration's F-1 engine, the most powerful rocket unit known, was shown recently for the first time.

The F-1, which has a thrust of 1.5 million pounds, is being developed for NASA by Rocketdyne, a division of North American Aviation, Inc., under the direction of the agency's Marshall Space Flight Center, Huntsville, Ala.

The decision to develop the F-1 was one of the first made by NASA after its establishment in October, 1958. The decision was made on the basis of an urgent, foreseeable need for a large thrust engine to power large space vehicles for such missions as manned circumlunar flights and landing a man on the moon and returning him to Earth.

Such a large vehicle--designated Nova--existed only as a design concept for several years.

It is possible, however, that first use of the F-1 engine could be in an advanced Saturn booster designed to approximately double the power of the Saturn C-1 booster. One possible configuration would be powered by a cluster of two F-1's for a lift-off thrust of 3 million pounds.

The mission of Nova will be to boost the Apollo to lunar landings and return to Earth. The configuration of Nova is under intensive study by NASA. Many of the versions under study employ F-1 engines in the first stage and some use F-1's in the second. One of a number of configurations employing F-1 engines consists of a booster made up of four clusters of two F-1's--or eight engines generating a total of 12 million pounds thrust. A possible second stage would be a cluster of two F-1's. The 200,000-pound-thrust J-2 engine--in a cluster of four--would power the third stage in this study configuration. This vehicle would have a capability of lifting some 160 tons into Earth orbit or some 50 tons on an escape mission.

TINY, TINY, TINY

An ultraminiature experimental transistor, so tiny that as many as 20,000 can fit on a postage stamp has been tested successfully at RCA Laboratories.

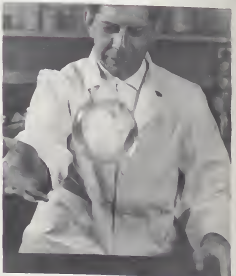
The transistor is made by depositing thin films by evaporation on an insulating base and is capable of shrinking the basic circuitry of a computer to the size of a book page. The basic circuitry of present-day computers ranges in size from the equivalent of a large hat box to a walk-in closet.

It is believed that this is the first time that transistors having useful performances have been produced entirely by the thin-film technique of evaporating all materials upon an insulating base--in this case, a glass plate.

Emphasizing the precision of the technique, Dr. James Hillier, Vice President, RCA Laboratories, points out that a complete three-stage amplifier including thin-film transistors and their connections could be produced this way on a surface only twice as wide as a human hair.

SILICONES IN SPACE

General Electric has reported the results of extensive laboratory testing of silicones for missiles and space vehicles and said that the tests suggested that many recently developed silicone materials demonstrated the ability to be operational in a wide variety of space applications where other known materials could not survive.



CLEAR SILICONE SPACE COMPOUND – An egg inside of a solid round ball of a clear, flexible potting compound, developed by General Electric for potting of electronic assemblies in missiles and space vehicles is used to demonstrate the cushioning protection afforded to delicate equipment by the material. G-E reports that the material, LTV-602, will not only protect electronic components from excessive shock and vibration, but also serves to shield components from moisture and contaminants. (General Electric Co., Silicone Products Dept., Waterford, N.Y.)

--Continued on page 23

it can usually be found in dairy goods which contain much calcium. Milk products become contaminated when grazing cattle consume grass on which strontium 90 has fallen and, thereby, concentrate small amounts which become significant when totaled. When cows are milked, the strontium 90 is transferred to the milk; after the dairy goods are consumed, the strontium 90 goes to the bone marrow where it can cause cancer or blood diseases.

Radioactivity in shallow water could effect marine life and could contaminate large areas due to the rapid mixing of waters on the oceans' surface. The radiation could be absorbed by various forms of life, plant and animal, and be stored in increasingly concentrated amounts. The result would be the compound infection of the water and seafood supply, both of which are vital to man.

> Ever since the atomic bomb pulverized the city of Hiroshima, the fear of the weapon has spread from the scientists to the peoples of the world--fear that soon they, too, together with their children, their friends, their enemies, will be nothing but an insignificant part of a brightly colored, gigantic cloud, dispersing slowly 50,000 feet above the surface of the earth.

Fears and anxieties are aroused by nuclear weapons. The intangibility of the killer radiation causes man to be suspicious, tense, and nervous. The destruction in an atomic war, the confusion, the death--all tend to make man slump into a corner with horror at just the thought. Yet, if there is a nuclear war, these dreaded fears will become very realistic. For this reason man must think of the consequences of using atomic and hydrogen bombs; he must weigh the few merits of the weapons against their many faults and arrive at a decision. This paper attempted to illustrate the destructive nature of the bombs--why the bombs should not be used. The results of the Hiroshima and Nagasaki bombings and many laboratory tests have served as evidence to the weapons' malice. "What to do now," the big decision, rests with the jury--the people of the world.

Winston Churchill summarizes the dilemma in these words:

> Man in this moment of his history has emerged in greater supremacy over the forces of nature than has ever been dreamed of before. He has it in his power to solve quite easily the problems of material existence. He has conquered the wild beasts, and he has even conquered the insects and the microbes. There lies before him, if he wishes, a golden age of peace and progress. All is in his hand. He has only to conquer his last and worst enemy--himself. With vision, faith, and courage, it may still be within our power to win a crowning victory for all.

ENGINEERS' DAY

February 23 & 24

A STUDENT PROJECT

THEORY BORED?

Here's your invitation to fill this void.

At least 30 government agencies and commercial firms
will assist in this project.

See any Engineers' Council member about your project.

CAMPUS NEWS

Elections were held during May and October for officers and members of the Engineers' Council. The results are as follows:

President	Floyd Matthews
Vice President	Richard Singer
Secretary	Harvey Flatt
Treasurer	Larry Hice
Assistant Treasurer	Donald Miller
Student Council Representative . . .	Ray Lupo
Raghu Chari	Deane Parker
Fred Hood	Joseph Sanford
Douglas Jones	John Wolfgang
Lee Kaminetzky	Dulaney DeButts
Randall Kenyon	Phillip Kaplan
Dan Mulville	John Scott

Also during the May meetings of the organizations and professional societies, elections were held for the executive offices.

ASCE

President . . . . Howard Hill
Vice President . . . . Wes Harris
Treasurer . . . . Paul Oscar
Secretary . . . . Arthur Nielsen

ASME

President . . . . Jerry Edwards
Vice President . . . . Joe Sanford
Treasurer . . . . Stuart Natov

IRE - AIEE

President . . . . John Wolfgang
Vice President . . . . Marvin Foxx
Secretary . . . . Judy Popowsky
Treasurer . . . . Walter Santilli

THETA TAU

Regent . . . . Fred Hood
Vice Regent . . . . Arthur Nielsen
Scribe . . . . Harvey Flatt
Treasurer . . . . Lloyd Reiser

SIGMA TAU

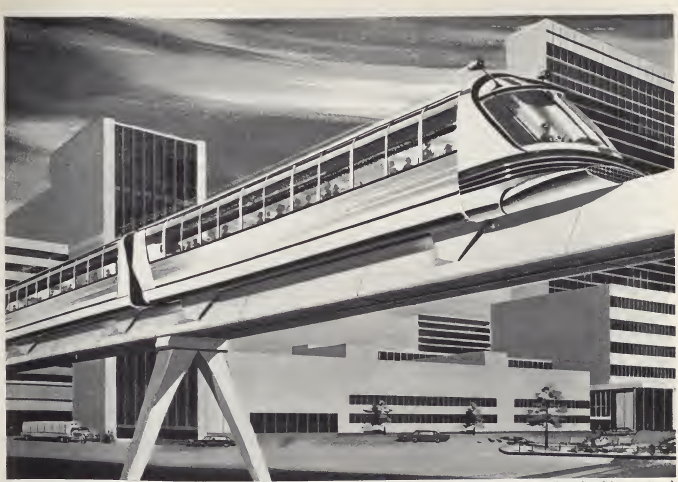
President . . . . Dan Kohr
Vice President . . . . Arthur Macurdy
Secretary . . . . Bob Sanford
Treasurer . . . . Dave Trask

The bulletin board which has been placed at the South end of Tompkins Hall contains society announcements and articles of special interest to the engineering student. These items include the presentation of movies pertaining to engineering by the societies. If you are addicted to the Late Show, you can satisfy your desires by attending these first run films on Wednesdays, 12:15 P.M., in room 200. Meet and greet your friends at the Tompkins Hall Theater.

The Engineers' Ball has been scheduled for the early part of the spring semester. Don't miss out on this gala affair. Be sure to get your dates well ahead of time. Tomorrow is not too soon to present your sales talk to a campus co-ed.

In the opening game of the intramural season the Engineers scored a decisive 13-0 victory over Tau Kappa Epsilon. Halfback Bob McCalley was elected MECHELECIV player of the week for his outstanding offensive playing. He personally accounted for 12 of the Engineers' points including a 65 yard touchdown run. The following week the Engineers suffered a 7-0 defeat at the hands of Calhoun Hall. The boys from Calhoun Hall played a good game and deserved to win. Any student in the School of Engineering who is interested in playing for the Engineers may contact Harvey Flatt for further information.

Again this year the Tutoring Committee of Sigma Tau will be available to help undergraduate Engineering students. Help may be received in any course in the undergraduate curriculum by leaving a note in the Sigma Tau mailbox of the Davis-Hodgkins House.



Monorail "Airtrain" — a compact, high-speed transportation system that will be automatic and practically noiseless. Construction is now being planned by leading U.S. cities to provide efficient, low-cost urban transit. Lightweight Monorail design demands strong, weight-saving metals. Logical choice: Nickel-containing materials such as nickel steels for the basic structure, nickel steel castings for underframes, trucks, other load-bearing assemblies. And Nickel Stainless Steel is a natural for skin and trim on cars—its excellent strength-to-weight ratio permits thinner gauge body shells for dead-weight reduction, its handsome finish stays virtually maintenance-free.

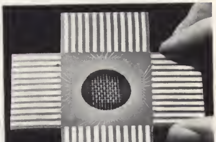
How Inco Nickel helps engineers make new designs possible and practical

When engineers design a transit system, a nuclear ocean liner, or a gas-turbine car, chances are Nickel, or one of its alloys can help the equipment perform better. Nickel-containing metals can provide valuable combinations of corrosion resistance, ductility, workability, and strength at extreme high and low temperatures. Over the years, Inco has developed new alloys and gathered data on the performance of materials under demanding service conditions. This data is available to help solve future metal problems.

Write to Inco Educational Services —ask for List "A". You'll find descriptions of 200 Inco publications covering applications and properties of Nickel and its alloys.

The International Nickel Company, Inc.
67 Wall Street, New York 5, N. Y.

38 billion light years — that's how far this 66-story telescope can "see" into space. Nickel in steel gave engineers a material tough enough to maintain precision in the rotating mechanism even with anticipated 20,000 ton load. Nickel used in steel members provided high strength at minimum weight to support the giant reflector.



Magnetic memory. This tiny part takes advantage of the unusual magnetic behavior of a twisted high-nickel alloy wire. Interwoven wire can store thousands of "bits" of information magnetically, ready to answer the computer's call. When twisted, this high-nickel alloy shifts magnetization direction from longitudinal to a helical path.

INCO **INTERNATIONAL NICKEL**

The International Nickel Company, Inc., is the U.S. affiliate of The International Nickel Company of Canada, Limited (Inco-Canada) — producer of Inco Nickel, Copper, Cobalt, Iron Ore, Tellurium, Selenium, Sulfur and Platinum, Palladium and Other Precious Metals.

"Fifteen years of low-temperature research in our own laboratories enabled us to translate these materials into the first magnet to achieve in practice the outstanding performance predicted by superconductor theory.

"We feel this is a turning point in this special field of research. Superconductivity will soon be making impact upon the lives of millions."

Dr. Hulm reported that the superconducting magnet contains a half-mile of wire about the diameter of a sewing thread. The wire is a niobium-zirconium base alloy of these two superconducting metals.

About 5000 turns of the threadlike wire are wound into a coil, or solenoid, two inches in diameter, one and one-half inches long, and with a "hole in the doughnut" of one-half inch.

The coil is immersed in a vessel of liquid helium which keeps it at a temperature near -450 degrees F. The energy required to cool the coil is only a small fraction of that needed to create a comparable magnetic field with a standard electromagnet. Essentially, therefore, the magnet produces almost all of its super-magnetism "for free."

Although only three times the thickness of a human hair, the wire from which the coil is wound carries a current of 20 amperes. At this current density, a scaled-up wire the thickness of a piece of chalk (one square centimeter) could carry 200,000 amperes, or the total installed capacity of the 2000 up-to-date homes in a town of 7000 people.

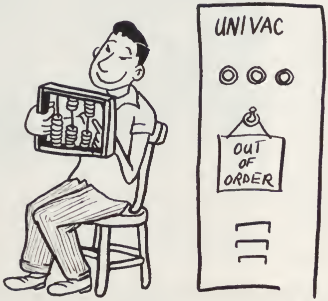
The wire, secret of the success of the entire Project, was designed, prepared and drawn up by metallurgists at the Westinghouse research laboratories, the Westinghouse materials manufacturing department, Blairsville, Pa., and Armetco, Inc., Wooster, Ohio.

Dr. Fraser, who led the metallurgical research team that produced the superconducting wire used in the new Westinghouse magnet, described it as "a major metallurgical problem." Special techniques had to be developed to prepare the alloy and take it through the complicated metal processing that resulted in the 10-mil wire.

"High-field superconducting materials are notoriously hard to handle," he said. "Some are as brittle as glass. All require the most careful processing if their superconducting properties are to be preserved.

"Niobium-zirconium base alloys are not the only superconducting materials available to us. Some have even better magnetic properties but are more difficult to process. We are investigating the metallurgy of the most promising of them.

"It is significant, we think, that this 'first-try' magnet is just about as strong as the most powerful continuous-service magnets to be constructed in more than a century of electromagnetic technology. Although considerable work remains to be done, there seems to be no fundamental metallurgical roadblock to the widespread development and use of superconducting magnets in the future."



The Company's Silicone Products Department, Waterford, New York, showed along with a number of other materials, silicone rubber compounds that had performed for limited periods of time at temperatures up to 9000°F, indicating that they could be used successfully for a broad range of applications in missiles and space vehicles to protect surfaces and components from extreme heat. Silicone rubber had previously been considered operational up to approximately 600°F.

Silicones are already being used extensively in present day missile, ground support and space vehicle applications. In missiles, the room temperature vulcanizing (RTV) liquid silicone rubber compounds are used in large quantities as a high temperature sealant between missile stages and as a coating in the skirt areas of missiles to protect the body of the vehicles from the tremendous heat of blast off. The new G-E data indicate their capabilities for even more severe uses. One of the most dramatic recent uses of a silicone rubber was as a sealant on the Mercury space craft, which carried the first U. S. astronaut into space. The silicone rubber in this instance not only served as a high temperature sealant to prevent leakage of atmosphere in space, but it also helped keep the capsule afloat after its descent into the Atlantic Ocean. Silicone rubber and other flexible silicone materials also serve as shock dampeners for delicate equipment in missiles and space capsules (see photo) as well as protective coatings for delicate equipment.

DO-IT-YOURSELF PRINTED CIRCUIT BOARDS

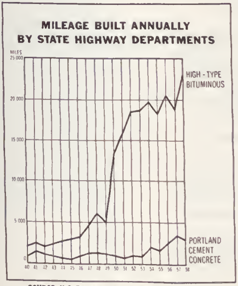
Grid boards have been put into kits that provide a designer with all materials needed to make prototype printed circuitry in 15 minutes, without leaving his desk. The kits, made by Corning Electronic Components, contain the etching resists and etching materials that work best with copper-clad Fotoceram glass-ceramic.

The grid boards, sold without accessories until now, are studded with .052-inch holes in a .1-inch grid, making circuit and component layout highly manageable. Users etch away the copper metallizing on the boards except where circuit runs and pads are desired.

The kit contains two 3-x-5 inch boards, grid paper for practice layouts, liquid etching resist for board circuit layout, vinyl resist tape, two bags of ammonium persulfate crystals for making etching solution, instructions, a price list for reordering individual processing materials, sources of alternative materials, addresses of suppliers, and a list of compatible tube and transistor sockets, connectors and miscellaneous hardware.

The kit comes in a plastic box that serves also as an etching pan. The liquid etching resist comes in a tube-pen with a ball point tip. The resist tape comes in a package consisting of 40 dots and 10 nine-inch strips. The ammonium persulfate needs addition only of warm tap water to make an etching solution.

Why America's state highway engineers give first choice to Modern High-Type Asphalt Pavement:



SOURCE: U.S. Bureau of Public Roads

The graph on the left shows you that in 1958 *alone* the use of high-type Asphalt pavement increased *618%* over 1940. This is because advances in engineering know-how, in Asphalt technology and in the development of the mechanical paver have made modern, high-type Asphalt pavement the first choice of highway engineers. Its more economical construction and low maintenance costs have saved many millions of tax dollars and kept America's wheels rolling.

Recent engineering advances have developed new, DEEP STRENGTH Asphalt pavement which will provide even better performance and greater pavement economy in the future.

The tax savings possible will amount to millions of dollars and will mean more and better local and interstate roads for our nation.

Your future success in civil engineering can depend on your knowledge of modern asphalt technology and construction. Send for your free "Student Kit" about Asphalt technology. Prepare for *your* future now!

Ribbons of velvet smoothness . . .
ASPHALT-paved Interstate Highways

THE ASPHALT INSTITUTE
Asphalt Institute Building, College Park, Maryland

Gentlemen: Please send me your free student portfolio on Asphalt Technology and Construction.

NAME______________________ CLASS__________
ADDRESS__________________________________
CITY______________________ STATE__________
SCHOOL___________________________________

While cleaning the bar, a bar tender noticed a friendly grass-hopper perched on a stool. By way of conversation, he said, "Say there little fellow, did you know we have a drink named after you?" The grasshopper said, "You mean you have a drink named Irving?"

And then there was the rather forlorn engineer who, on seeing a pigeon flying over head, exclaimed: "Go ahead, everybody else does."

Girls who do everything under the sun ought to have their hides tanned.

"Professor," said the engineer in search of knowledge, "will you try to explain to me the theory of limits."

"Well, John, assume that you have called on your girl friend. You are seated at one end of the divan and she is seated at the other. You move halfway toward her. Then you move half of the remaining distance toward her. Again you reduce the distance by 50%. Continue this for some time. Theoretically, you will never reach her. On the other hand, you will soon get close enough to her for practical purposes."

Then there was the absent minded professor who forgot to write a $3.50 textbook to sell his classes.

Definition: An experienced secretary is one who knows how to keep her employer from ending a sentence with a preposition.

A group of Russians stood at the Pearly Gates. "Amazing!" said Saint Peter, "But you can't come in; you're atheists." "Who wants to come in?" said the Russian spokesman. "We just want our dog back."

Did you hear about the cannibals son? He liked his girls best when they were stewed.

"What a splendid fit," said the tailor as he carried the epileptic out of his shop.

Traveler: "Porter, get me another glass of ice water."

Porter: "Sorry, suh, but if I takes any mo' ice, dat co'pse in the baggage car ain't going to keep."

Daughter: "I took Charles into the loving room last night and..."

Mother: "that's LIVING dear."

Daughter: "your telling me!"

"How are the children getting along?"

"Oh, fine. Tony wants to be a racketeer and Molly wants to be a chorus girl."

"But what happened to Al?"

"Oh, we had to shoot him. He wanted to be an engineer."

KLOP!

This note was left as a memo on a doctor's desk:

Mrs. Kon Klop
Aszunas ya common
Klop!
Nomerra awlet zgonbe
Klop!

After much research and cogitation the note was deciphered as follows:

Mrs. Cohen called up.
As soon as you come home
Call up!
No matter how late it's going to be
Call up!

Dartmouth students really turned the tables when forced to pay a poll tax to the city of Hanover. Officials of the town explained, over indignant protest, that the college was regarded as being within the city limits, and that payment of the tax would give students a vote in the town meeting.

One thing that was overlooked was the fact that this gave the collegians a majority vote. Before any of the officials knew what was happening, a motion that the town build a city hall one inch square and one half mile high, had been made, seconded, and passed by a lawful majority.

Tramp: "Could I get a bite to eat, Mam? The car's stalled a mile back yonder".

Woman: "What kind of car is it?"

Tramp: "A Pennsylvania, Mam. Dis freight congestion is fearful."

SAVE MONEY

WITH THESE LOW COLLEGE RATES!

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Interview with General Electric's Dr. J. H. Hollomon

Manager—General Engineering Laboratory

Society Has New Needs and Wants—Plan Your Career Accordingly

DR. HOLLOMON is responsible for General Electric's centralized, advanced engineering activities. He is also an adjunct professor of metallurgy at RPI, serves in advisory posts for four universities, and is a member of the Technical Assistance panel of President Kennedy's Scientific Advisory Committee. Long interested in emphasizing new areas of opportunity for engineers and scientists, the following highlights some of Dr. Hollomon's opinions.

Q. Dr. Hollomon, what characterizes the new needs and wants of society?

A. There are four significant changes in recent times that characterize these needs and wants.

1. The increases in the number of people who live in cities: the accompanying need is for adequate control of air pollution, elimination of transportation bottlenecks, slum clearance, and adequate water resources.

2. The shift in our economy from agriculture and manufacturing to "services": today less than half our working population produces the food and goods for the remainder. Education, health, and recreation are new needs. They require a new information technology to eliminate the drudgery of routine mental tasks as our electrical technology eliminated routine physical drudgery.

3. The continued need for national defense and for arms reduction: the majority of our technical resources is concerned with research and development for military purposes. But increasingly, we must look to new technical means for detection and control.

4. The arising expectations of the peoples of the newly developing nations: here the "haves" of our society must provide the industry and the tools for the "have-nots" of the new countries if they are to share the advantages of modern technology. It is now clearly recognized by all that Western technology is capable of furnishing the material goods of modern life to the billions of people of the world rather than only to the millions in the West.

We see in these new wants, prospects for General Electric's future growth and contribution.

Q. Could you give us some examples?

A. We are investigating techniques for the control and measurement of air and water pollution which will be applicable not only to cities, but to individual households. We have developed, for example, new methods of purifying salt water and specific techniques for determining impurities in polluted air. General Electric is increasing its international business by furnishing power generating and transportation equipment for Africa, South America, and Southern Asia.

We are looking for other products that would be helpful to these areas to develop their economy and to improve their way of life. We can develop new information systems, new ways of storing and retrieving information, or handling it in computers. We can design new devices that do some of the thinking functions of men, that will make education more effective and perhaps contribute substantially to reducing the cost of medical treatment. We can design new devices for more efficient "paper handling" in the service industries.

Q. If I want to be a part of this new activity, how should I plan my career?

A. First of all, recognize that the meeting of needs and wants of society with products and services is most important and satisfying work. Today this activity requires not only knowledge of science and technology but also of economics, sociology and the best of the past as learned from the liberal arts. To do the engineering involved requires, at least for young men, the most varied experience possible. This means working at a number of different jobs involving different science and technology and different products. This kind of experience for engineers is one of the best means of learning how to conceive and design—how to be able to meet the changing requirements of the times.

For scientists, look to those new fields in biology, biophysics, information, and power generation that afford the most challenge in understanding the world in which we live.

But above all else, the science explosion of the last several decades means that the tools you will use as an engineer or as a scientist and the knowledge involved will change during your lifetime. Thus, you must be in a position to continue your education, either on your own or in courses at universities or in special courses sponsored by the company for which you work.

Q. Does General Electric offer these advantages to a young scientist or engineer?

A. General Electric is a large diversified company in which young men have the opportunity of working on a variety of problems with experienced people at the forefront of science and technology. There are a number of laboratories where research and advanced development is and has been traditional. The Company offers incentives for graduate studies, as well as a number of educational programs with expert and experienced teachers. Talk to your placement officers and members of your faculty. I hope you will plan to meet our representative when he visits the campus.

A recent address by Dr. Hollomon entitled "Engineering's Great Challenge — the 1960's," will be of interest to most Juniors, Seniors, and Graduate Students. It's available by addressing your request to: Dr. J. H. Hollomon, Section 699-2, General Electric Company, Schenectady 5, N.Y.

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